*Plane Trigonometry and Applications.* By E. J. WILCZYNSKI, Professor of Mathematics in the University of Chicago. Edited by PROFESSOR H. E. SLAUGHT. Allyn and Bacon, 1914. xi+265 pages. $1.25.
*Logarithmic and Trigonometric Tables.* By the same author and editor. Allyn and Bacon, 1914. xx+97 pages. $1.00.

Every friend of mathematics and every friend of mathematical teaching must rejoice when scholars of national and international reputation give their time to the compiling of text-books in the more elementary branches of the science. It is a serious mistake to suppose that high school teachers are best equipped to write high school texts. It is particularly fortunate when the author is not only a scholar of wide outlook, but also a man with a keen instinct for teaching. When, moreover, the work of such a man has passed under the searching eye of an editor who is also an acknowledged leader in mathematical teaching, it is natural to expect much in advance of the book.

The work is divided into two parts, the first of which is devoted to the solution of triangles. The trigonometric functions of acute angles are defined as usual, and the notion of the general angle is deferred till part two. This is precisely the method which a less experienced teacher would avoid. Why not give the general definition at the very first, and avoid the readjusting of ideas made necessary by two different definitions? This is, indeed, a very vital and important matter in pedagogy. There is a tendency of late years to hurry the child into algebra before it has had time to get acquainted with the simpler conceptions of arithmetic. Why study arithmetic when you might as well be studying the more general science? Why not, indeed? And why not study the theory of groups in the grades, seeing that algebra is, in the last analysis, a chapter in abstract groups? The reviewer looks with admiration on the skilful means by which all of the formulæ for the solution of triangles, both right and oblique, are developed without the assistance of coördinate geometry, and even without the use of the addition theorems. Even the law of tangents has been derived by purely synthetic methods. Professor Wilczynski has hit upon the happy device of giving a central position to the area problem. All the formulæ of trigonometry present themselves naturally with a unifying point of attack. This part is also published separately and would seem to be admirably adapted for use in secondary schools.

Much attention is given in Part One to the subject of computation. The author is a computor of many years experience and can speak with authority on this subject. The *negligence* of expressing a result in fewer decimal places than one is able to guarantee, and the *dishonesty* of expressing it in more are topics dwelt on with some warmth. The reviewer is a little disconcerted, however, to find the so-called *abbreviated method* of multiplication referred to as preferable to the ordinary method. They are both so very bad that it is difficult to say which is worse.

There is also in this chapter a lucid discussion of logarithms, which with the illustrative examples will be easily grasped by any class. A short description is also given of the slide-rule.

The book of tables published with the trigonometry should be noted in connection with part one. It is a very attractively constructed table of five-place logarithms, both of numbers and of trigonometric functions. The spacing is generous and well calculated to relieve the eye of undue strain. A number of smaller tables are also given in the book, such as extra tables for " small " angles; a table of four places for the natural functions; a table of squares; a table for transforming angles; a list of constants; and three small three-place logarithmic tables. Altogether a very useful book of tables.

Part Two of the trigonometry contains, besides the discussion of the general angle, and the addition theorems and consequences of them, certain chapters not usually met with in treatises on the elements of this subject. The chapter on directed line-segments is a good introduction for the study of projective geometry and for the study of vector analysis. The chapter on inverse functions is one that will be of value to every student who will go on to the study of the calculus. It is a refreshing thing to see an American text-book with the notation " Arc sine."

Perhaps the most unusual feature of the book is the insertion of the chapter on the Theory of Wave Motion which closes the book. It is a subject of unusual interest and importance, and the chapter is one of the most beautiful in the book. We doubt, however, whether many teachers will venture to include it in a course where students are apt to have as little mathematical maturity as most students of trigonometry do. Such things, however, are worth while placing where teachers and students can have a look at them sometimes; and who knows whether twenty years from now they may be included in the earlier years of the student's life just as now we include the study of the calculus in the freshman and sophomore years and not in the very last year as was the custom twenty years ago.

Much of interest in historical matter has been introduced " not in the form of detached historical notes, but organically connected with the topic under discussion." This appears to the reviewer to be a decided improvement on the usual method, but he cherishes the belief that the effect would be much better if the historical matter were collected into a separate chapter at the end of the book, and the subject discussed as a whole,—but each one to his taste in such matters.

The reviewer has not given the book a microscopic examination for printer's errors, and mis-spelled words. He has not even worked out any of the trigonometric identities, of which he is glad to note the fewness, but he has been impressed with the inviting appearance of the pages, and the successful arrangement of the matter on the page. These details count for much more in making a usable book than teachers sometimes think.

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